STS5N15F4

N-channel 150 V, 0.057Ω, 5 A, SO-8
STripFET™ DeepGATE™ Power MOSFET

Features

Type	V_{DSS}	$R_{DS(on)}$ max	I_D
STS5N15F4	150 V	< 0.063 Ω	5 A

- ■ N-channel enhancement mode
- ■ 100% avalanched rated
- ■ Low gate charge
- ■ Very low on-resistance

Application

- ■ Switching applications

Description

This STripFET™ DeepGATE™ Power MOSFET technology is among the latest improvements, which have been especially tailored to minimize on-state resistance, with a new gate structure, providing superior switching performances.
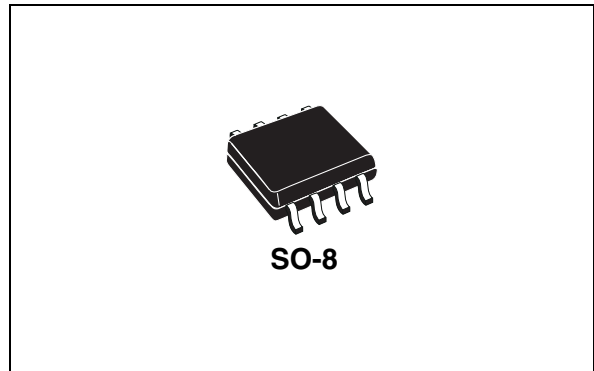

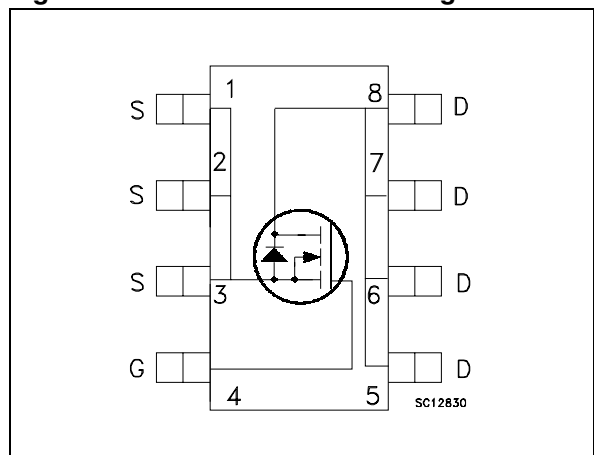**SO-8**

Figure 1.   Internal schematic diagram

Table 1.   Device summary

Order code	Marking	Package	Packaging
STS5N15F4	5U15-	SO-8	Tape and reel

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage (V_{GS} = 0)	150	V
V_{GS}	Gate-source voltage	± 20	V
I_D	Drain current (continuous) at T_C = 25 °C	5	A
I_D	Drain current (continuous) at T_C=100 °C	3	A
I_{DM}[(1)]	Drain current (pulsed)	20	A
P_{TOT}	Total dissipation at T_C = 25 °C	2.5	W
T_{stg}	Storage temperature	-55 to 150	°C
T_j	Operating junction temperature		

1. Pulse width limited by safe operating area

Table 3. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj-pcb}$[(1)]	Thermal resistance junction-pcb max	50	°C/W

1. When mounted on FR-4 board of 1 inch², 2 oz Cu, t < 10 sec

Table 4. Avalanche characteristics

Symbol	Parameter	Max value	Unit
I_{AS}	Avalanche current, repetitive or not-repetitive (pulse width limited by T_j max)	5	A
E_{AS}	Single pulse avalanche energy (starting T_j = 25 °C, I_D = I_{AS}, V_{DD} = 140 V)	125	mJ

2 Electrical characteristics

(T_J = 25 °C unless otherwise specified)

Table 5.   On/off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	I_D = 1 mA, V_{GS}= 0	150			V
I_{DSS}	Zero gate voltage drain current (V_{GS} = 0)	V_{DS} = 150 V, V_{DS} = 150 V, @125 °C			1 10	µA µA
I_{GSS}	Gate body leakage current (V_{DS} = 0)	V_{GS} = ±20 V			±100	nA
$V_{GS(th)}$	Gate threshold voltage	V_{DS}= V_{GS}, I_D = 250 µA	2		4	V
$R_{DS(on)}$	Static drain-source on resistance	V_{GS}= 10 V, I_D= 2.5 A		0.057	0.063	Ω

Table 6.   Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss} C_{oss} C_{rss}	Input capacitance Output capacitance Reverse transfer capacitance	V_{DS} =25 V, f = 1 MHz, V_{GS} = 0	-	2710 180 69.5	-	pF pF pF
Q_g Q_{gs} Q_{gd}	Total gate charge Gate-source charge Gate-drain charge	V_{DD} = 75 V, I_D = 5 A V_{GS} =10 V *Figure 14 on page 7*	-	48 10.8 13.7	-	nC nC nC
R_g	Gate input resistance	f=1 MHz Gate DC Bias=0 Test signal level=20 mV open drain	-	1.9	-	Ω

Table 7.   Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r $t_{d(off)}$ t_f	Turn-on delay time Rise time Turn-off delay time Fall time	V_{DD}= 75 V, I_D= 3 A, R_G=4.7 Ω, V_{GS}=10 V *Figure 13 on page 7*	-	13.5 5.1 39.7 11.4	-	ns ns ns ns

Table 8.   Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max	Unit
I_{SD}	Source-drain current		-		5	A
I_{SDM}[1]	Source-drain current (pulsed)		-		20	A
V_{SD}[2]	Forward on voltage	I_{SD} = 6 A, V_{GS} = 0	-		1.3	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	I_{SD} = 6 A, di/dt = 100 A/µs, V_R = 120 V, T_J = 150 °C *Figure 15 on page 7*	-	85.2 277.6 8.2		ns nC A

1. Pulse width limited by safe operating area

2. Pulsed: pulse duration=300µs, duty cycle 1.5%

2.1 Electrical characteristics (curves)
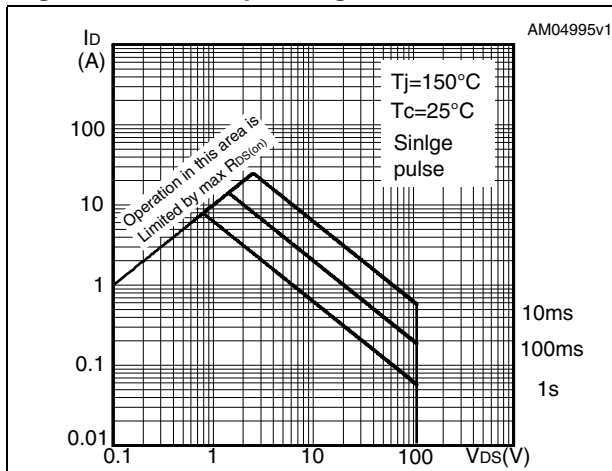
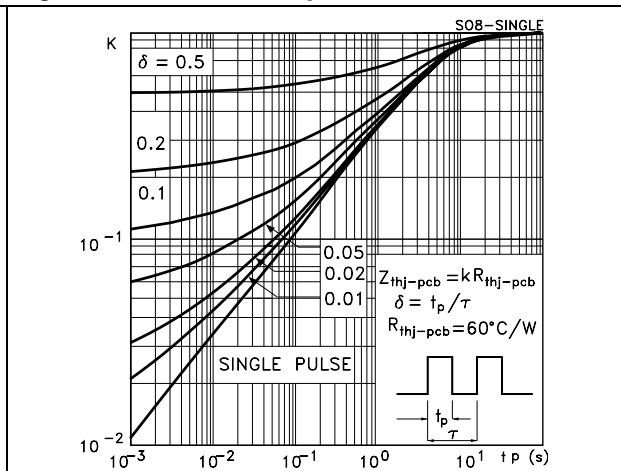**Figure 2.   Safe operating area**

Figure 3.   Thermal impedance
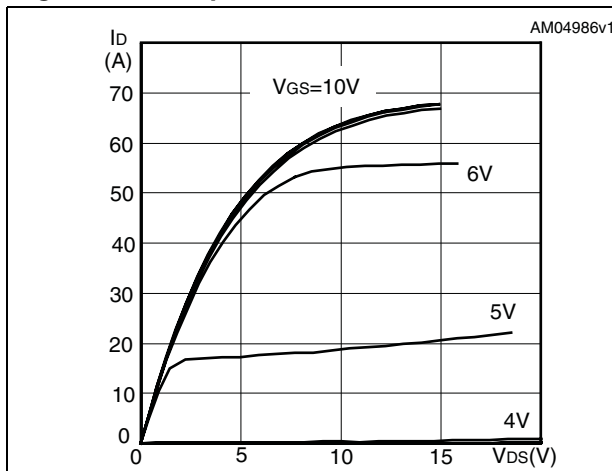

Figure 4.   Output characteristics
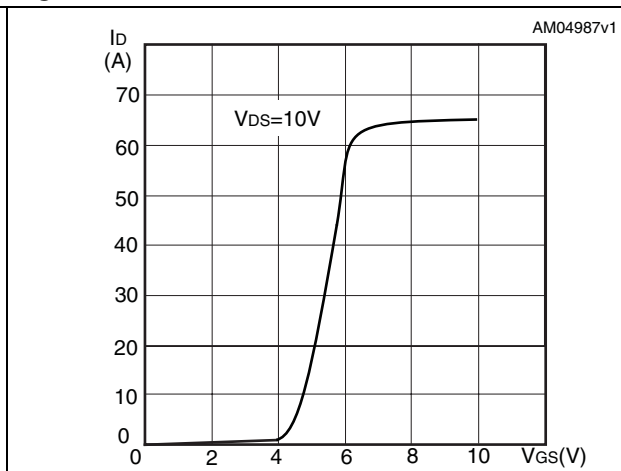

Figure 5.   Transfer characteristics

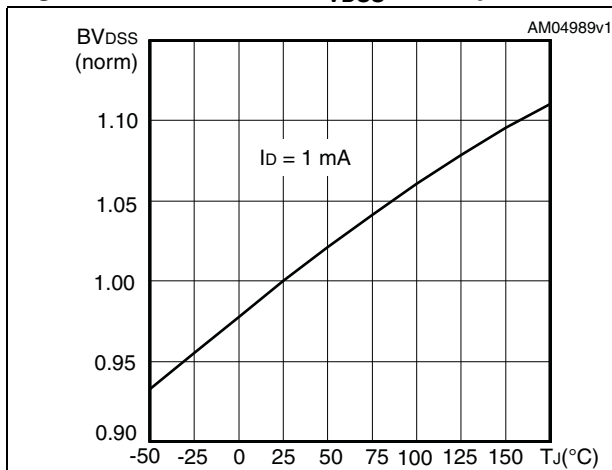**Figure 6.   Normalized B$_{VDSS}$ vs temperature**
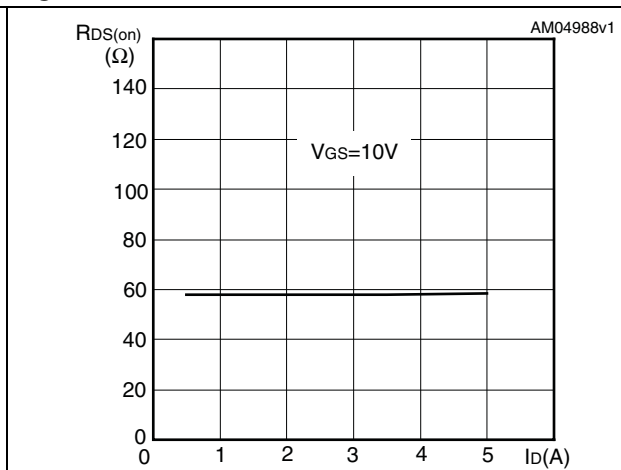

Figure 7.   Static drain-source on resistance

Figure 8.   Gate charge vs gate-source voltage

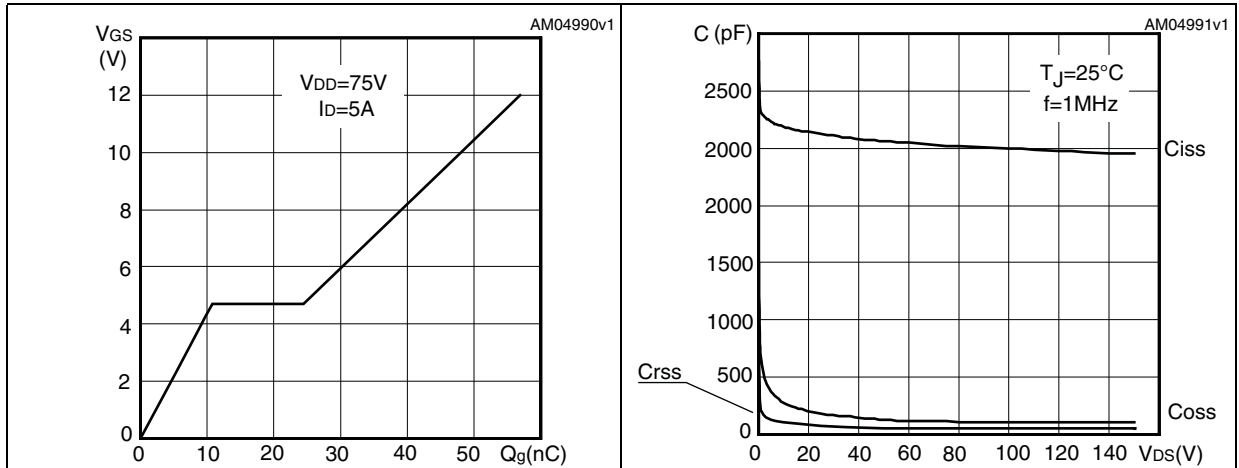**Figure 9.   Capacitance variations**

Figure 10.   Normalized gate threshold voltage vs temperature

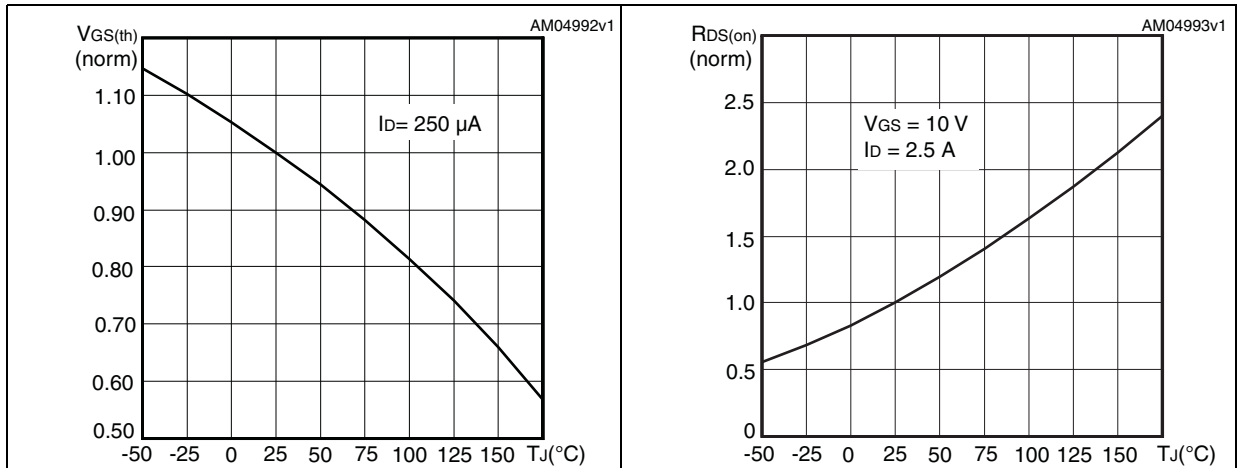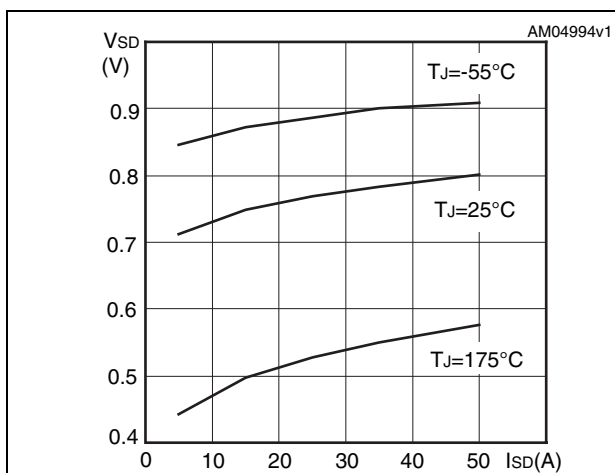**Figure 11.   Normalized on resistance vs temperature**

Figure 12.   Source-drain diode forward characteristics

3   Test circuits
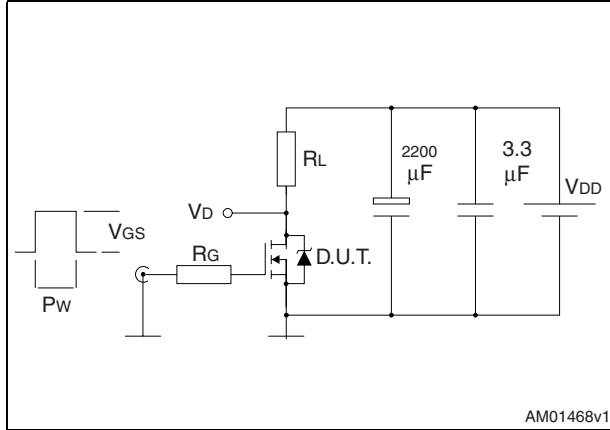
Figure 13.   Switching times test circuit for resistive load

AM01468v1

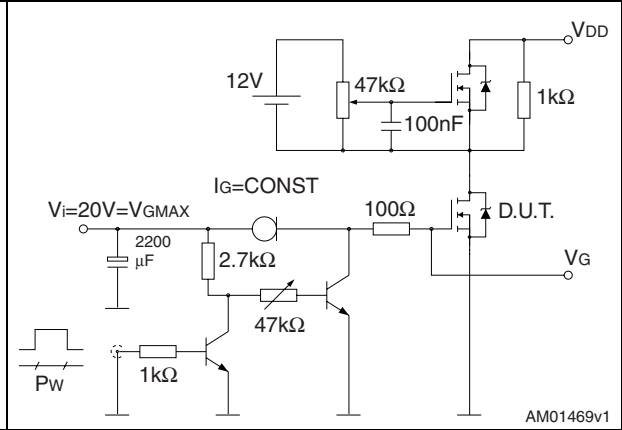**Figure 14.   Gate charge test circuit**

AM01469v1

Figure 15.   Test circuit for inductive load switching and diode recovery times

AM01470v1
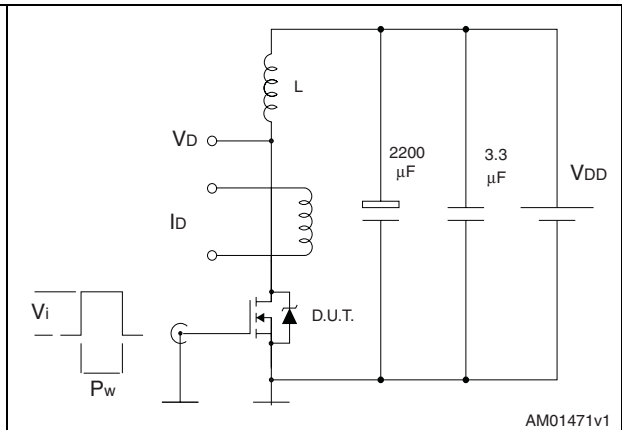
Figure 16.   Unclamped inductive load test circuit

AM01471v1

Figure 17.   Unclamped inductive waveform
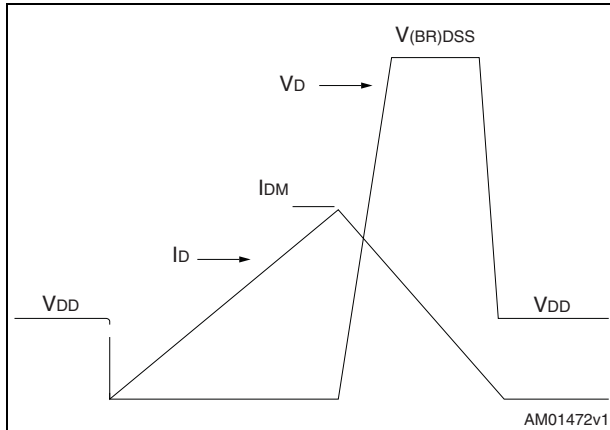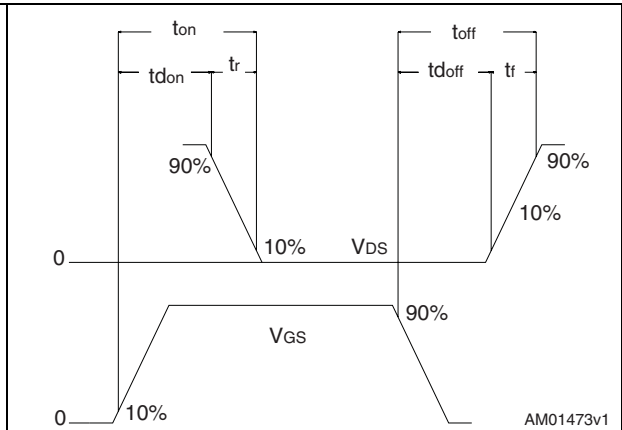

AM01472v1

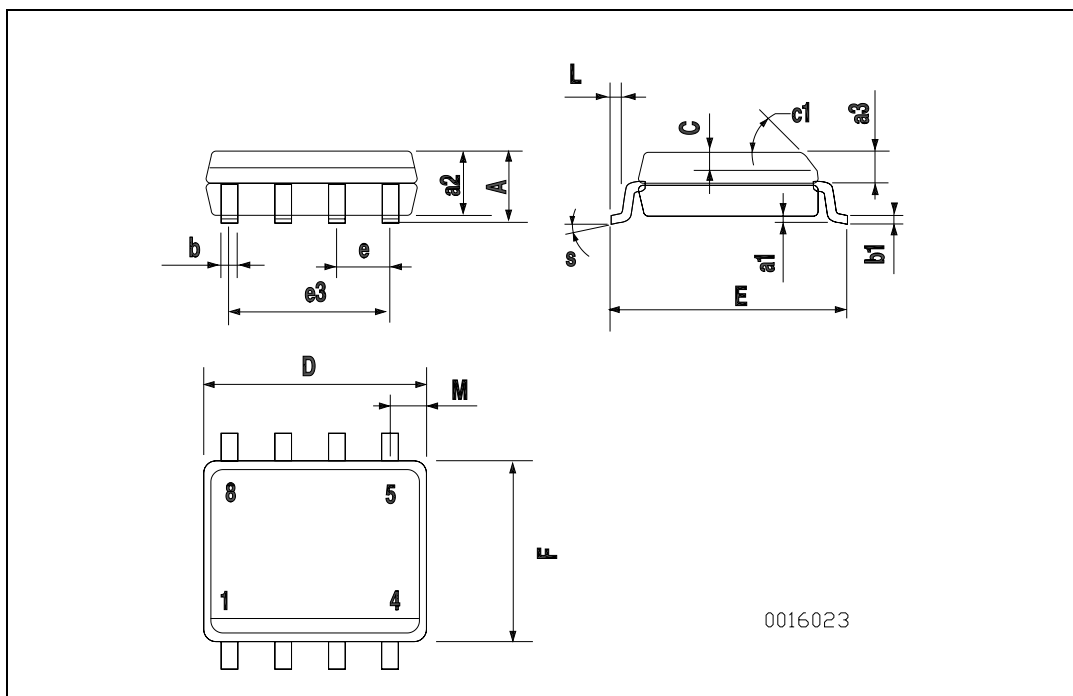**Figure 18.   Switching time waveform**

AM01473v1

4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK is an ST trademark.

SO-8 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			1.75			0.068
a1	0.1		0.25	0.003		0.009
a2			1.65			0.064
a3	0.65		0.85	0.025		0.033
b	0.35		0.48	0.013		0.018
b1	0.19		0.25	0.007		0.010
C	0.25		0.5	0.010		0.019
c1	45 (typ.)					
D	4.8		5.0	0.188		0.196
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		3.81			0.150	
F	3.8		4.0	0.14		0.157
L	0.4		1.27	0.015		0.050
M			0.6			0.023
S	8 (max.)					

0016023

5 Revision history

Table 9. Document revision history

Date	Revision	Changes
23-Jul-2009	1	First release
03-Aug-2009	2	Updated figures *6*, *7*, *10* and *11*

Please Read Carefully:

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

UNLESS EXPRESSLY APPROVED IN WRITING BY AN AUTHORIZED ST REPRESENTATIVE, ST PRODUCTS ARE NOT RECOMMENDED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. ST PRODUCTS WHICH ARE NOT SPECIFIED AS "AUTOMOTIVE GRADE" MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER'S OWN RISK.

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for MOSFET *category:*

Click to view products by STMicroelectronics *manufacturer:*

Other Similar products are found below :

614233C 648584F IRFD120 JANTX2N5237 FCA20N60_F109 FDZ595PZ 2SK2545(Q,T) 405094E 423220D TPCC8103,L1Q(CM MIC4420CM-TR VN1206L SBVS138LT1G 614234A 715780A NTNS3166NZT5G SSM6J414TU,LF(T 751625C BUK954R8-60E DMN3404LQ-7 NTE6400 SQJ402EP-T1-GE3 2SK2614(TE16L1,Q) 2N7002KW-FAI DMN1017UCP3-7 EFC2J004NUZTDG ECH8691-TL-W FCAB21350L1 P85W28HP2F-7071 DMN1053UCP4-7 NTE221 NTE2384 NTE2903 NTE2941 NTE2945 NTE2946 NTE2960 NTE2967 NTE2969 NTE2976 NTE455 NTE6400A NTE2910 NTE2916 NTE2956 NTE2911 DMN2080UCB4-7 TK10A80W,S4X(S SSM6P69NU,LF DMP22D4UFO-7B